REMARKS

By the present amendment and response, claims 1, 10, 17, 23, and 33 have been amended to overcome the Examiner's objections and new claims 36-38 have been added. New claim 36 is the independent form of claim 9, which includes the limitations of base claim 1 and any intervening claims, new claim 37 is the independent form of claim 16, which includes the limitations of base claim 10 and any intervening claims, and new claim 38 is the independent form of claim 35, which includes the limitations of base claim 33 and any intervening claims. New claims 36-38 are thus allowable according to the Examiner's comments on page 6 of the Office Action dated June 16, 2004. Thus, claims 1-38 remain in the present application and claims 36-38 are now in condition for allowance. Reconsideration and allowance of outstanding claims 1-35 in view of the following remarks are requested.

The Examiner has rejected claims 1, 5-6, 10, 17, 23-24, 28-29, and 33-34 under 35 USC §103(a) as being unpatentable over U.S. patent number 6,182,258 to Yoav Hollander ("Hollander") in view of U.S. patent number 5,881,267 to Dearth et al. ("Dearth"). For the reasons discussed below, Applicant respectfully submits that the present invention, as defined by amended independent claims 1, 10, 17, 23, and 33, is patentably distinguishable over Hollander and Dearth, singly or in combination thereof.

The present invention, as defined by amended independent claim 1, includes, among other things, creating models of components and a set of function calls in a high level general purpose programming language and executing a virtual prototype, where

models communicate through a transaction based interconnect and cycle accurate information is generated, and where the transaction based interconnect includes the set of function calls. As disclosed in the present application, the present invention provides a simulation environment that introduces a higher level of abstraction than existing hardware description language (HDL) system models. As disclosed in the present application, individual components of a system model in the present invention's simulation environment can be written in a high level general purpose programming language, such as C or C++.

As disclosed in the present application, by using a higher level of abstraction in the system model and the simulation environment, the present invention significantly reduces the number of instructions required to simulate a system design in a cycle base simulation. As a result, the present invention advantageously achieves a significant reduction in total simulation time, while maintaining accurate detail in the simulation.

As disclosed in the present application, by abstracting a collection of signal changes that comprise an event into discrete transaction based interfaces, the present invention allows the simulation to complete each transaction with a simple function call. As a result, the present invention advantageously reduces the number of operations required to simulate frequently repeated transaction, such as memory lookups.

In contrast, Hollander does not teach, disclose, or suggest creating models of components and a set of function calls in a high level general purpose programming language and executing a virtual prototype, where models communicate through a

transaction based interconnect and cycle accurate information is generated, and where the transaction based interconnect includes the set of function calls. Hollander is directed to a technique for generating system tools used to verify a device under test (DUT), which may include modules, chips, simulations, or systems. See, for example, Hollander, column 4, lines 44-51. Hollander specifically discloses a technique for generating test vectors used as input stimuli to, for example, a simulator. However, Hollander fails to teach, disclose, or remotely suggest creating models of components and a set of function calls in a high level general purpose programming language and executing a virtual prototype, where models communicate through a transaction based interconnect and cycle accurate information is generated, and where the transaction based interconnect includes the set of function calls.

In contrast, Dearth does not teach, disclose, or suggest creating models of components and a set of function calls in a high level general purpose programming language and executing a virtual prototype, where models communicate through a transaction based interconnect and cycle accurate information is generated, and where the transaction based interconnect includes the set of function calls. Dearth is directed to providing virtual bus stubs, which can be distributed among constituent computers of a computer network, and a central resolver that cooperate to simulate a bus, which is connected between multiple circuit parts of a simulated circuit. See, for example, the Abstract of Dearth. Dearth specifically discloses virtual bus stubs (VBS) 114A and 114B, which are included in simulation systems 116A and 116B, respectively, and which

collectively simulate bus 214, which is connected between circuit parts 212A and 212B. See, for example, column 4, lines 31-35 and Figures 1 and 2 of Dearth. In Dearth, circuit parts 212A and 212B are simulated by distributed simulation parts (DSP) 112A and 112B.

In Dearth, the model within simulation system 116A which represents a simulated circuit is generally in the form of a hardware descriptive language. See, for example, Dearth, column 6, lines 53-55. However, a hardware descriptive language is not the same as a high level general purpose programming language, as specified in amended independent claim 1. Furthermore, Dearth fails to teach, disclose, or suggest creating models in a high level general purpose programming language.

In Dearth, DSP 112A communicates with VBS 114A, which in turn communicates with resolver 302 in hub 110A, and DSP 112B communicates with VBS 114B, which in turn communicates with resolver 302. See, for example, column 7, lines 21-29 and Figure 3 of Dearth. In Dearth, resolver 302 resolves the state of bus 214 as simulated by VBSs 114A and 114B. See, for example, column 7, lines 28-29. Thus, in Dearth, DSP 112A does not communicate directly with DSP 112B. Furthermore, Dearth fails to teach, disclose, or suggest models of a virtual prototype communicating through a transaction based interconnect, where the transaction based interconnect includes a set of function calls. Moreover, Dearth fails to even mention a transaction based interconnect that includes a set of function calls. Dearth specifically discloses a remote procedure call, which is not the same as a function call created in a high level general purpose

programming language as specified in amended independent claim 1. Thus, Dearth fails to cure the deficiencies of Hollander as discussed above.

For the foregoing reasons, Applicant respectfully submits that the present invention, as defined by amended independent claim 1, is not suggested, disclosed, or taught by Hollander and Dearth, singly or in combination. As such, the present invention, as defined by amended independent claim 1, is patentably distinguishable over Hollander and Dearth. Thus claims 5 and 6 depending from amended independent claim 1 are, *a fortiori*, also patentably distinguishable over Hollander and Dearth for at least the reasons presented above and also for additional limitations contained in each dependent claim.

Furthermore, independent claims 10, 17, 23, and 33 have been amended to recite that the models communicate through a transaction based interconnect, which includes at least one function call. Thus, for similar reasons as discussed above, the present invention, as defined by amended independent claims 10, 17, 23, and 33, is not suggest, disclosed, or taught by Hollander and Dearth. As such, the present invention, as defined by amended independent claims 10, 17, 23, and 33, is patentably distinguishable over Hollander and Dearth. Thus, claims 24 and 28-29 depending from amended independent claim 23, and claim 34 depending from amended independent claim 33 are, *a fortiori*, also patentably distinguishable over Hollander and Dearth for at least the reasons presented above and also for additional limitations contained in each dependent claim.

The Examiner has further rejected claims 2-4, 7-8, 11-14, 18-20, 25-27, 30, and 31 under 35 USC §103(a) as being unpatentable over Hollander in view of Dearth and in

further view of U.S. patent number 5,732,192 to Malin et al. However, as discussed above, amended independent claims 1, 10, 17, 23, and 33 are patentably distinguishable over Hollander and Dearth. Thus, claims 2-4 and 7-8 depending from amended independent claim 1, claims 11-14 depending from amended independent claim 10, claims 18-20 depending from amended independent claim 17, and claims 25-27, 30, and 31 depending from amended independent claim 23 are, *a fortiori*, also patentably distinguishable over Hollander and Dearth for at least the reasons presented above and also for additional limitations contained in each dependent claim.

Based on the foregoing reasons, the present invention, as defined by amended independent claims 1, 10, 17, 23, and 33 and claims depending therefrom, is patentably distinguishable over the art cited by the Examiner. Thus, dependent claims 2-9, 11-16, 18-22, 24-32, and 34-35 pending in the present application are patentably distinguishable over the art cited by the Examiner. For all the foregoing reasons, an early allowance of outstanding claims 1-35 and an early Notice of Allowance directed to all claims 1-38 are respectfully requested.

Attorney Docket No.: 02CON360P

Respectfully Submitted,
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Dated: 11/15/04

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